



State of California  
The Resources Agency  
Department of Forestry

# STATE FOREST NOTES

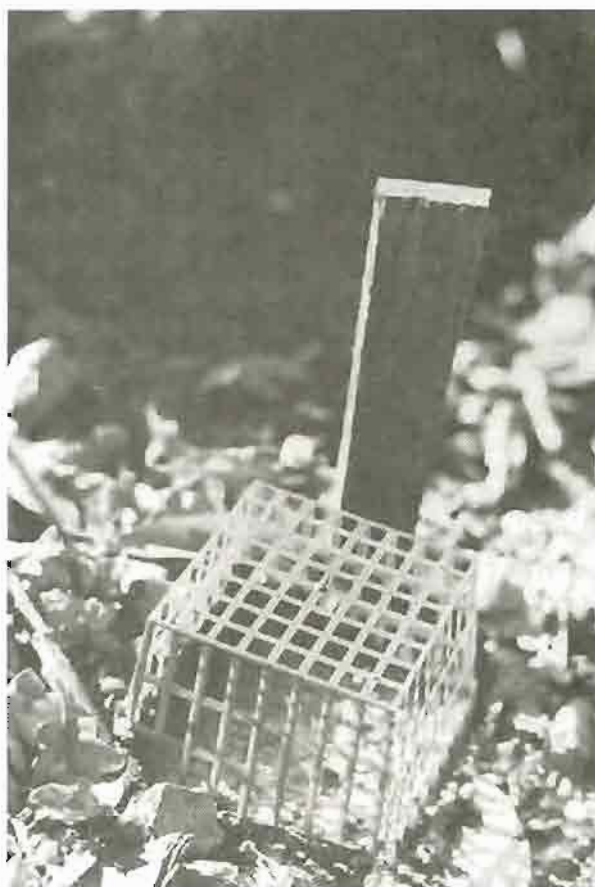
1416 Ninth Street  
Sacramento, CA 95814  
Phone 916-445-5571

No. 68

October 1977

## REFINEMENTS IN SEEDSPOTTING DOUGLAS-FIR

By Raymond C. Utterback and James M. Berry <sup>1/</sup>



Stakes and screens were used to relocate and protect seedspots.

<sup>1/</sup> R. C. Utterback, Forest Advisor, California Department of Forestry, Santa Rosa.

J. M. Berry, Forester, Berry's Mill, Cazadero, California.

## ABSTRACT

Seedspotting Douglas-fir does not appear to be a satisfactory alternative to planting seedlings even with refinements in techniques. The refinements included in this study were: (1) staking each seedspot to insure relocation for observation, (2) making germination tests on seed before sowing; (3) a combination of stratifying seed, treating it with fungicide, and providing seed spots with protection from animal damage with a plastic berry box screen; and (4) protection from animal damage only.

## INTRODUCTION

Over the years, it has become apparent that bare root Douglas-fir seedlings do not achieve satisfactory survival in reforestation projects for some areas of California. This fact tends to discourage the planting of this species. However, Douglas-fir is a valuable species and in portions of the State it is the only native commercial conifer on which the timber industry presently relies.

In an effort to better establish seedlings, alternate regeneration methods were examined. Of the methods considered direct seeding, in particular the seedspot, was selected for trial.

It was recognized that direct seeding has not always proven to be a successful reforestation method (Schubert and Adams, 1971). A list was made of factors that may affect the success of a seedspot. Factors considered in this study were: (1) animal damage, (2) disease, and (3) seed dormancy.

## METHOD

Seed for the study was purchased by Berry's Mill, Cazadero, California, from Simpson Timber Company. The vendor had coated the seed with endrin and aluminum dust.

Germinative capacity (the percentage of seed that will germinate within a specified period of time) was determined by the California Department of Forestry, Davis Nursery seed laboratory. Tests were made in November and December, 1975. Test results gave the seed a germinative capacity of 54 percent in 28 days.

Five locations for the study were selected in the forested northwest corner of Sonoma County. This part of the county is within Site Classes III and IV of the Redwood-Douglas-fir timber type. In each of the five locations a one-fifth acre test plot with 99 spots was established. Each spot within the plot was staked so it could be easily relocated.

The most obvious problem with any kind of direct seeding is animal depredation. To overcome this, it was decided to screen each spot with plastic berry boxes. They are readily available, inexpensive, and deteriorate in sunlight thus allowing the seedling to develop.

The next problem is that of pathogens. Some species of soil fungi are responsible for damping off, a major cause of seedling mortality in forest tree nurseries (Johnson and Harvey, 1975). Damping off may also be a major cause of seedling mortality in natural and direct seeding. To test this, it was decided to use Dexon 35 WP to treat the seed before spotting (Johnson and Harvey, 1975).

A third factor is that of conditioning seed prior to germination. Stratification, a moist chill treatment, overcomes the seeds internal dormancy and increases percentage and strength of germination (U. S. Forest Service, 1974). Stratification in this study was done by soaking the seeds in water for 48 hours, mixing it into wet vermiculite, and chilling it at 40° F. for 30 days before sowing.

The study included a control and two treatment variables. Treatments were:

1. Control, seed sown as purchased.
2. Seed stratified, treated with fungicide and animal protection.
3. Seed sown as purchased with animal protection.

Each treatment was replicated three times on each of the five plots (fig. 1).

TREATMENT	1	1	1	1	1	1	1	1	1	1	1
"	2	2	2	2	2	2	2	2	2	2	2
"	3	3	3	3	3	3	3	3	3	3	3
"	1	1	1	1	1	1	1	1	1	1	1
"	2	2	2	2	2	2	2	2	2	2	2
"	3	3	3	3	3	3	3	3	3	3	3
"	1	1	1	1	1	1	1	1	1	1	1
"	2	2	2	2	2	2	2	2	2	2	2
"	3	3	3	3	3	3	3	3	3	3	3

Figure 1. Plot Layout for Seedspot Test.

Plots were established in December, 1975. Seed was sown by the spot method on February 4 and 5, 1976. All spots were scraped to mineral soil in a 6-inch circle. An average of 10 seeds were sown per spot with a Panama seeder (Schubert and Fowells, 1964). Seeds were covered with 1/4 to 1/2 inch of soil.

## RESULTS

Germination checks were made in April and May of 1976. A survival check was made in September. Table 1 gives the results.

Table 1. Initial stocking and survival of Douglas-fir seedspots in five locations by treatment. a/

Plot Number & Name	Stocked spots in May			Spots stocked with live seedlings in September		
	TREATMENTS <u>b/</u>			TREATMENTS <u>b/</u>		
	1	2	3	1	2	3
	- - - - - percent - - - - -					
#1 Chadwick	18	57	33	0	3	0
#2 Brown	6	27	15	0	1	0
#3 Berry	45	54	48	0	12	0
#4 Monte Rio	15	39	21	6	18	15
#5 Tyrone	15	30	18	3	18	0
Average All Plots	20	41	27	2	10	3

a/ A stocked seedspot includes all dead and live germinants in May and surviving seedlings in September.

b/ Treatment 1 - Control. Seed sown as purchased.  
 Treatment 2 - Stratification, fungicide and animal protection.  
 Treatment 3 - Animal protection only.

## SUMMARY AND CONCLUSION

Results of the study indicated that Treatment 2 was best. That is, stratifying seed, treating it with fungicide and screening for protection from animals produced best germination and survival.

There are some confounding factors associated with this study. The plots sustained damage from several sources. At one location, the public cut firewood from the plot. At another location sheep were grazed. At a third location heavy deer damage was sustained. Two-thirds of the berry baskets had been destroyed by the time the survival check was made in September (fig. 2).



Fig. 2. Damaged screen, cause unknown. Note seedlings in center of photo.

The elements of Treatment 2 should be tested separately to determine if one or the other was responsible for the superior performance. The element of animal protection was isolated in Treatment 3. It did indicate a small survival advantage for the use of berry box screens.

Drought undoubtedly was another confounding factor having adverse affect on survival. The study was conducted during one of the driest winters recorded in California history. Precipitation at stations in the study area was between 42 and 63 percent of normal (table 2).

Table 2. Percent of normal precipitation, January 1 through June 30, 1976 in seedspot test area.<sup>a/</sup>

Precipitation Station	Percent
Cazadero	59
Potter Valley	63
Ukiah	53
Booneville Maintenance Station	56
Santa Rosa	55
Fort Ross	53
Healdsburg	42

<sup>a/</sup> California Department of Water Resources. July 1976.

In conclusion, survival of seedlings in seedspots under conditions of this study was generally poorer than we would expect from planting seedlings. At this point, it would not be recommended as an alternative to the planting of seedlings.

#### LITERATURE CITED

- California Department of Water Resources. 1976. Water conditions in California. State of California, The Resources Agency, Department of Water Resources, Bulletin No. 120.76.
- Johnson, David W. and Robert D. Harvey, Jr. 1975. Seed protectant fungicides for control of Douglas-fir and ponderosa pine seedling root rots. Tree Planters' Notes, 26(2):3-5.
- Schubert, Gilbert H. and Ronald S. Adams. 1971. Reforestation practices for conifers in California. The Resources Agency, Department of Conservation, Division of Forestry. 359 pp. illus.
- Schubert, Gilbert H. and Harry A. Fowells. 1964. Sowing rates for reforestation by the seed-spotting method. U. S. Forest Service, Pacific Southwest Forest and Range Experiment Station, Research Note PSW-44, 9 pp., illus.
- U. S. Forest Service. 1974. Seeds of woody plants of the United States, Agriculture Handbook No. 450, U. S. Department of Agriculture. 883 pp., illus.

CALIFORNIA DEPARTMENT OF FORESTRY  
1416 Ninth Street  
Sacramento, California 95814

To: